

MU-SPIN UPDATE

MU-SPIN/MURED 10th Annual Users' Conference

September 11-15, 2000

Morris Brown College

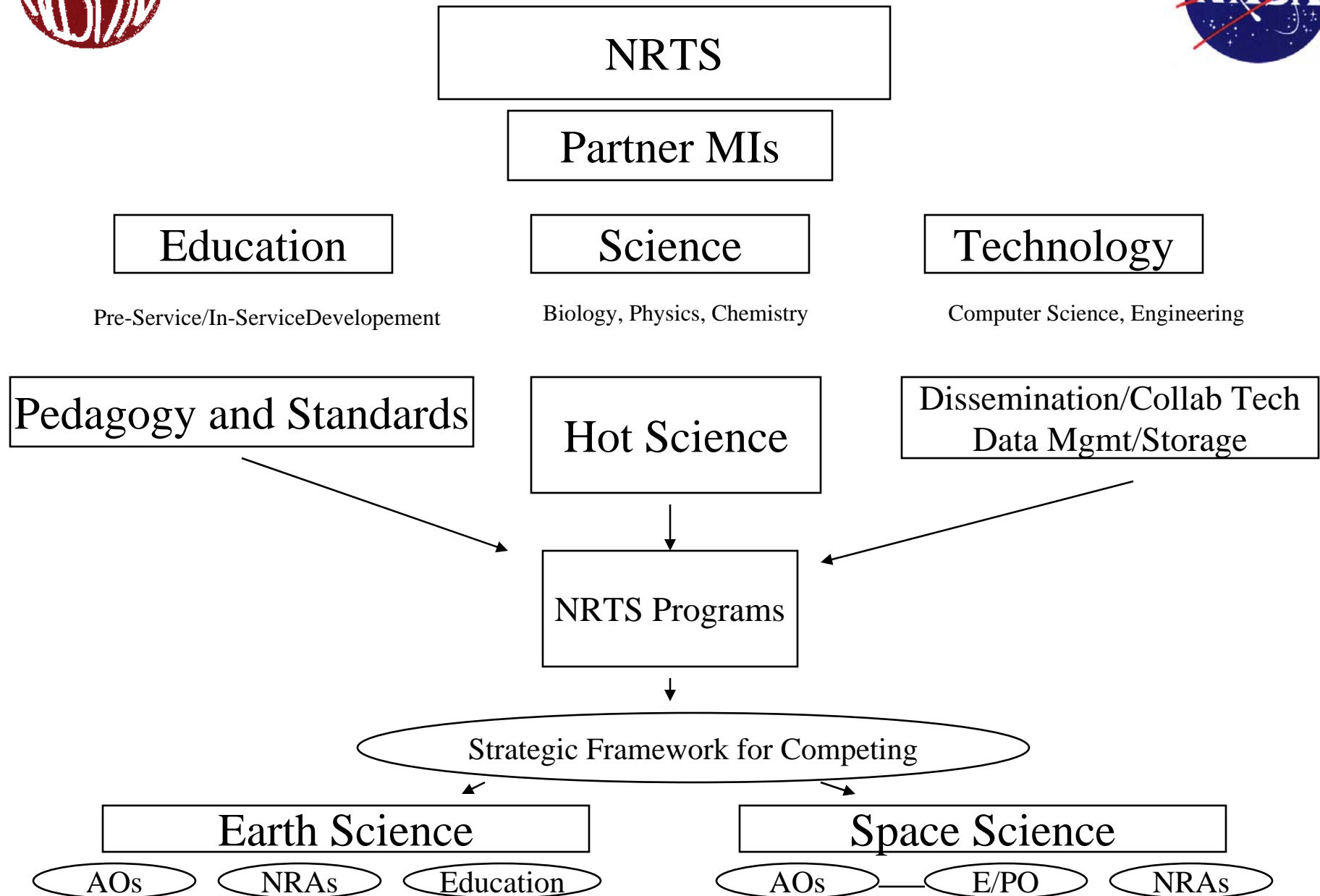


MU-SPIN DESCRIPTION

The Minority University Space Interdisciplinary (MU-SPIN) Network project is a comprehensive outreach and education initiative that focuses on the transfer of advanced computer networking technologies and relevant science to Historically Black Colleges and Universities (HBCU's) and Other Minority Universities (OMU's) for supporting multi-disciplinary education research.



Strategic Framework for 2000





Institutions Hosting Fall/Spring Workshops

- South Carolina State U.
- Prairie View A&M U.
- Elizabeth City State U.
- University of Texas at El Paso
- Tennessee State U.
- City College of NY
- Morgan State U.
- Morris Brown College
- Morris College
- Central State University
- New Mexico State University
- Texas A&M U. at CC
- UNC at Pembroke
- U. of Maryland at ES
- Benedict College
- Alabama A&M U.
- Southern U. at NO
- Cal State U. at LA
- Meharry Medical Coll
- Kentucky State U.
- Voorhees Coll.
- Florida International U.
- Southwestern Indian Poly Inst
- Dine College
- Virginia State U.
- Fisk U.
- Norfolk State U.
- Paul Quinn Coll.
- Bowie State U.
- Bennett Coll
- Kentucky State U.
- Jackson State U.



**Institutional Research Awards
(Minority Universities
Information Network for Research and
Education)**

CONTINUATION PROPOSAL GUIDELINES

Limited to the Existing NASA Institutional Research Awards at:

*The City College of New York
Elizabeth City State University
Morgan State University
Prairie View A & M University
South Carolina State University
Tennessee State University
The University of Texas at El Paso*

Guidelines Issued: June 21, 2000

Areas of Interest

Each participating IRA (Minority Universities Information Network for Research and Education) is expected to continue research and/or education activities and student development based on the 'Expert Institute' areas in which they are already working. There should be increased and sustained emphasis on developing expertise capable of successfully leveraging support from sources outside of the NASA IRA (Minority Universities Information Network for Research and Education) program. Proposals requesting over \$25,000 should define 'Expert Institute' activities at partner institutions which require additional funds. Each partner 'Expert Institute' concept should be described in an appendix with a budget description accompanied by a letter of commitment from the participating institution representative.

IRAs (Minority Universities Information Network for Research and Education) Performance Metrics

Each IRA (Minority Universities Information Network for Research and Education) must propose additional measures against which it will evaluate the performance of its operation. Additionally, all grantees are required to submit, as part of their annual report, a complete and timely response to NSAMUREP's annual Uniform Outcomes Report. This report is used to satisfy congressional and White House requirements for reporting MUREP performance. The following are metrics for which each IRA (Minority Universities Information Network for Research and Education) should report as part of their annual cooperative agreement renewal report.

Research Activity Metrics

Outcome: To increase the number of MI faculty and students in NA SA related research which will contribute substantially to the NA SA mission and move the IRA recipients increasingly toward gaining support from sources outside the IRA Program.

- Number and types of NRTS collaborating research activities relevant to the NA SA Strategic Enterprises.
- Number and types of workshops held to support the NRTS collaboration research efforts.
- Number and types of attendees participating in the research oriented workshops.
- Number and types of institutions participating in research oriented workshops.
- Number and types of proposals submitted in response to a NA SA research announcement.
- Number and types of institutions participating in NRTS research oriented collaborations.
- Amount of leveraged funding received from NRTS research related activities.
- Number and types of facilitated research publications.
- Number and types of funded awards from NRTS research activities.
- Number of students participating in NRTS research activities.

Edu catio n Ac tivi ty Me trics

Outcome : To provide a quality learning and research environment to inspire an increase in the number and quality of students, including pre-service student teachers achieving degrees in NASA related S M E T field s.

- **Number and types of NRTS collaborating education activities relevant to the NASA Strategic Enterprises.**
- **Number and types of workshops held to support the NRTS collaboration education efforts.**
- **Number of pre-service teachers impacted by education activities.**
- **Number of in-service teachers impacted by education activities.**
- **Number and types of institutions participating in education oriented workshops.**
- **Number and types of proposals submitted in response to a NASA education announcement.**
- **Number and types of NASA Enterprise Education products systematically implemented by NRTS and partner institutions.**
- **Number and types of institutions participating in NRTS education oriented collaborations.**
- **Amount of leveraged funding received from NRTS education related activities.**
- **Number and types of NRTS facilitated education publications.**
- **Number and types of funded awards from NRTS education activities.**
- **Number of students participating in NRTS education activities.**

Technology Activity Metrics

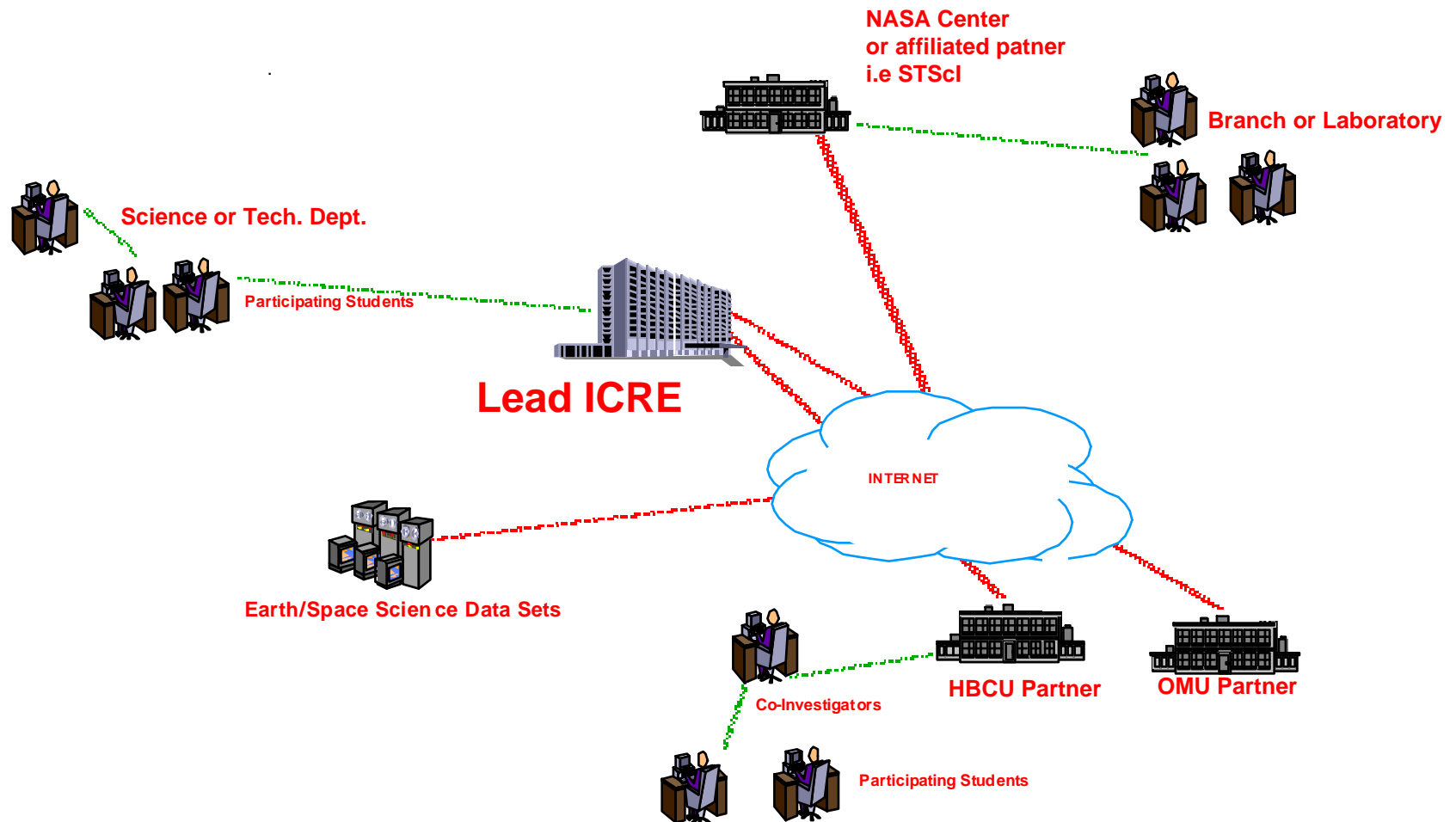
Outcome : To improve the capacity of MIs to provide a technology rich environment which promotes increase d usage of technology for research and education for increasing the number and quality of students graduating with S MET degrees.

- Number and types of institutions participating in technology oriented workshops.
- Number and types of electronic networks funded being being leveraged to support research and education related activities.
- Number and types of proposals submitted in response to a NASA research announcement.
- New technology deployed in region to support collaboration for research and education.
- New technology deployed in region to support research.
- New technology deployed in region to support education .
- Number and types of technology departments (i.e. Computer Science, Engineering, Information Systems, etc.) in the region participating in the support of NRTS regional research and/or education technology requirements.
- Number of students in technology departments participating in technology efforts.
- Amount of leveraged funding received for improving technology infrastructure from NRTS activities.

Institute for Collaborative Research and Education

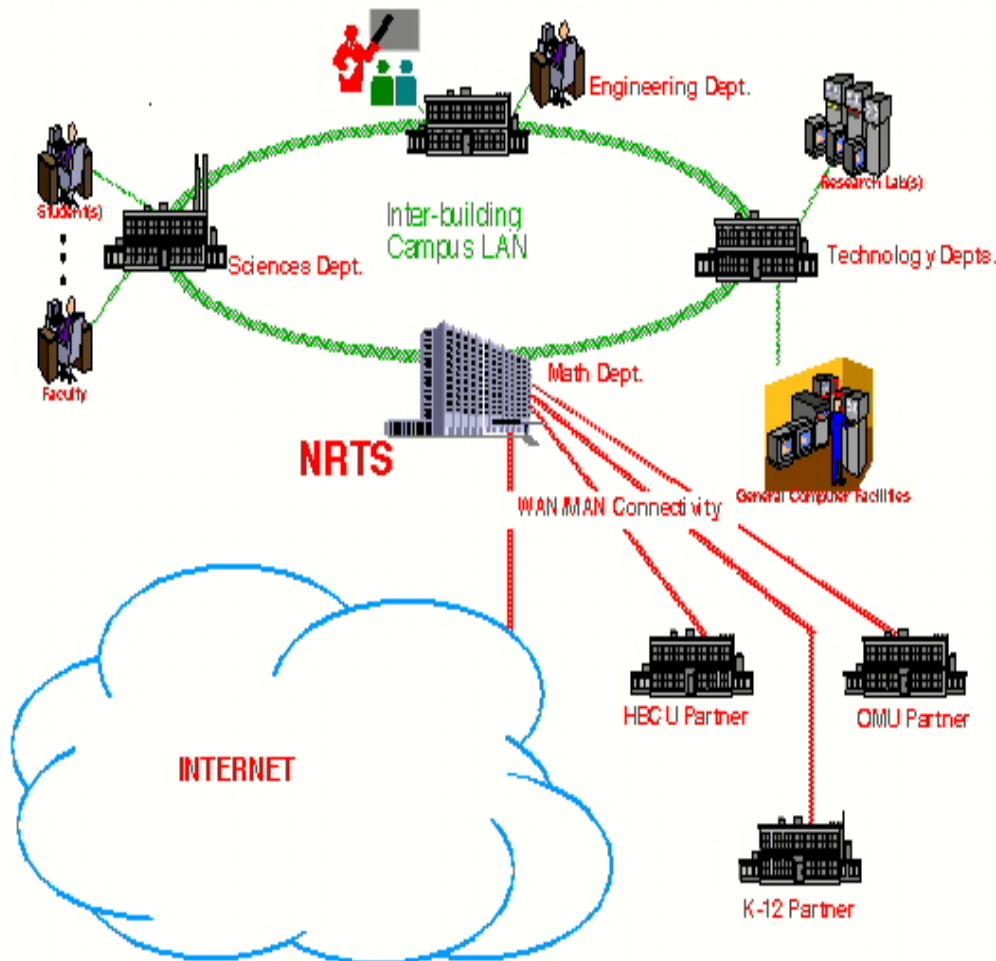
- o Perform collaborative research in a NASA related activity as a virtual institute;
- o Outreach to a minimum of two HBCUs or OMUs ; and
- o Assist in coordination and provide content to a minimum of two NRT academic year workshops on NASA collaborative science and technology

S



Network Resources and Training Site Concept

- o Connect all Math, Science, Engineering and Technology Departments to the Internet
- o Outreach to a minimum of four HBCUs or OMUs and one K-12 for LAN and WAN requirements; and
- o Host a minimum of two academic year workshops on LAN/WAN technology and NASA related science.





Activity Platforms

- Collaborative Research and Education
 - SCSU Astronomy Institute
 - TSU Astronomy/Planetary Geography Education
 - PVAMU Solar Research
- Science Curriculum Reform
 - Code FE NOVA/MU-SPIN workshops
- Flight Research Support/Team Building
 - Understanding the OSS Strategic Plan and Themes
 - Mentoring flight alternatives and competitive science
 - Promoting diverse team building
- Collaborating E/PO for MESSENGER

**Search for
Origins**

**Structure & Evolution
of the Universe**

**Exploration of the
Solar System**

**The Sun-Earth
Connection**

What is Space Science?

NASA's Space Science Enterprise is responsible for all of NASA's programs relating to astronomy, the solar system, and the sun and its interaction with Earth. That includes all of NASA's telescopes and planetary probes. Our research covers everything from the middle levels of Earth's atmosphere (about 60 kilometers up) to the edge of the universe billions of light years away.

Multi-Mission Programs

The following programs include multiple missions, many of which are linked above. You can see brief descriptions of these programs, along with links to them, by clicking here.

Discovery Program

Explorer Program

Mars Exploration program at JPL

New Millennium Program

International Solar-Terrestrial Physics

Scientific Balloons and Ultra-Long Duration Balloons

Solar-Terrestrial Probes

Sounding Rockets

Spartan

Ground-Based Astronomy

Most of our research activities are carried out using spacecraft or suborbital vehicles (sounding rockets, balloons, and high-altitude aircraft). The National Science Foundation is the government agency that is responsible for most U.S. ground-based astronomical research. However, we do support a few ground-based activities



In space exploration, the possibilities for discovery are without limits. Even with the vast amount of knowledge gained since exploration of our solar system began, there are still more questions than answers.

NASA's Discovery Program gives scientists the opportunity to dig deep into their imaginations and find innovative ways to unlock the mysteries of the universe. It represents the implementation of NASA Administrator Daniel Goldin's vision of "Faster, Better, Cheaper" planetary missions.

The program's prime objective is to enhance our understanding of the solar system, both historically and as it is today, by exploring the planets, their moons and other small bodies, either by traveling to them or remotely from the vicinity of Earth.



DISCOVERY MISSION: DEEP IMPACT

The First Look Inside a Comet!

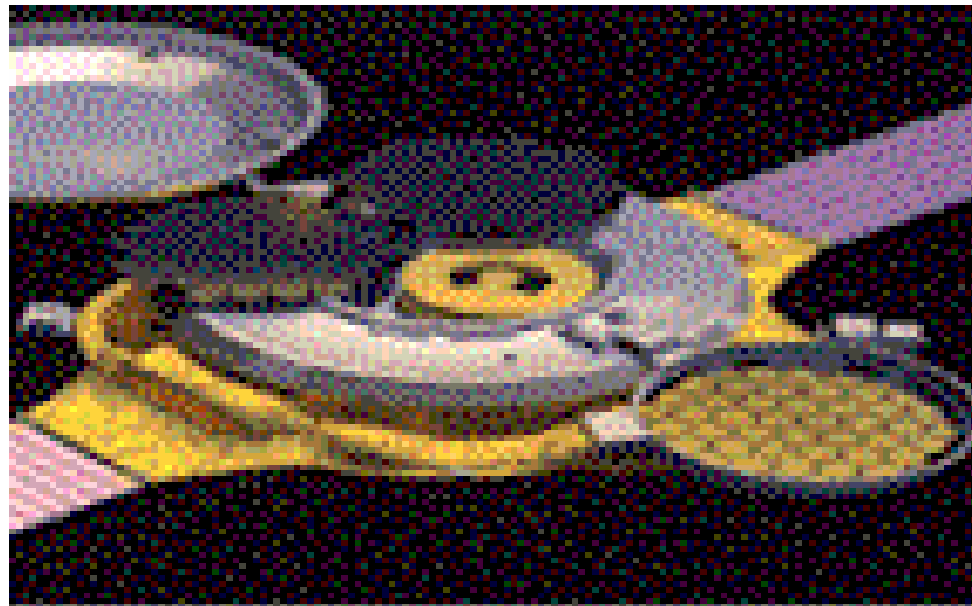




GENESIS

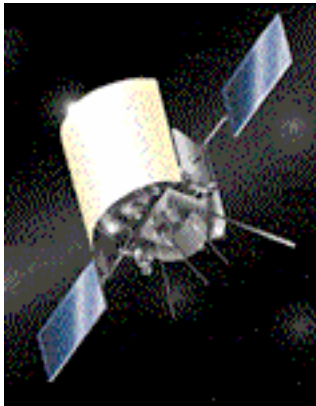
SEARCH FOR ORIGINS

What is the sun made of? Are the Earth and planets made of the same stuff?





DISCOVERY MISSION: MESSENGER



The MESSENGER (MErcury: Surface, Space ENvironment, GEochemistry and Ranging) mission is a scientific investigation of the planet Mercury.

Understanding Mercury and the forces that have shaped it is fundamental to understanding the evolution of terrestrial planets.

MISSION OBJECTIVES

MESSENGER will be launched in March 2004 and will enter Mercury Orbit in September 2009, to peel back Mercury's veil of mystery.



To implement and coordinate the ambitious MESSENGER E/PO program, the project engages diverse groups of skilled professionals from several organizations:

MST - Messenger Science Team members

AAAS - American Association for the Advancement of Science

CCSSE - Challenger Center for Space Science Education

SSAI - Science Systems and Applications, Inc

CASE - Carnegie Academy for Science Education

JHU/APL - The Johns Hopkins University Applied Physics Laboratory

GSFC - Goddard Space Flight Center

SEI - Space Explorers Inc.

CERES - Center for Educational Resources at Montana State University-Bozeman

NASM - National Air and Space Museum

AMNH - American Museum of Natural History in New York

MU-SPIN - Minority University-Space Interdisciplinary Network

PW - Parmee/Weinrich independent television production/direction team



Science Team

William McClintock
University of Colorado
 Ralph L. McNutt
JHU Applied Physics Laboratory
 Scott L. Murchie
JHU Applied Physics Laboratory
 Stanton J. Peale
University of California - Santa Barbara
 Roger J. Phillips
Washington University

 Mark S. Robinson
Northwestern University
 James A. Slavin
 NASA Goddard Space Flight Center
 David E. Smith
 NASA Goddard Space Flight Center
 Robert G. Strom
 University of Arizona
 Jacob I. Trombka
 NASA Goddard Space Flight Center
 Maria T. Zuber
Massachusetts Institute of Technology

Mario H. Acuna
 NASA Goddard Space Flight Center
 Daniel N. Baker
University of Colorado
 William V. Boynton
University of Arizona

 Clark R. Chapman
 Southwest Research Institute
 Andrew F. Cheng
JHU Applied Physics Laboratory

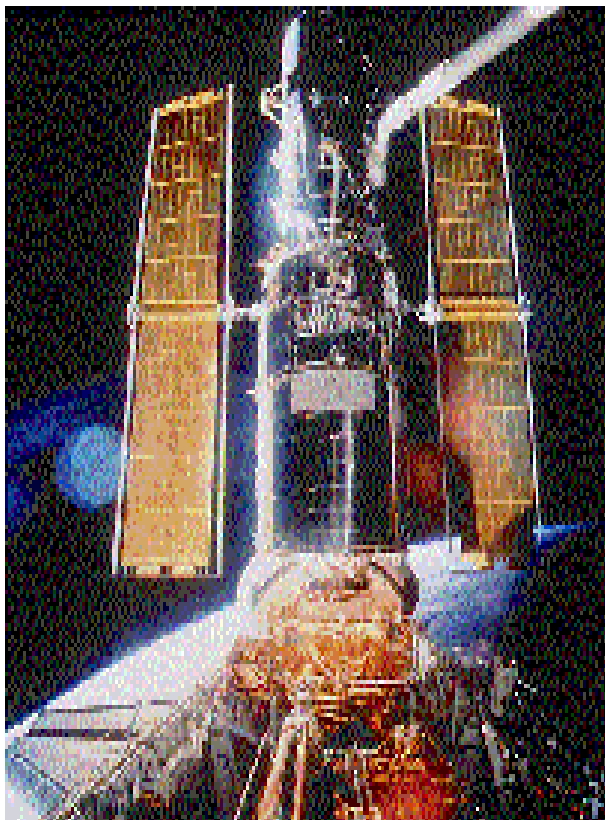
 George Gloeckler
University of Michigan / University of Maryland

 Robert E. Gold,
JHU Applied Physics Laboratory

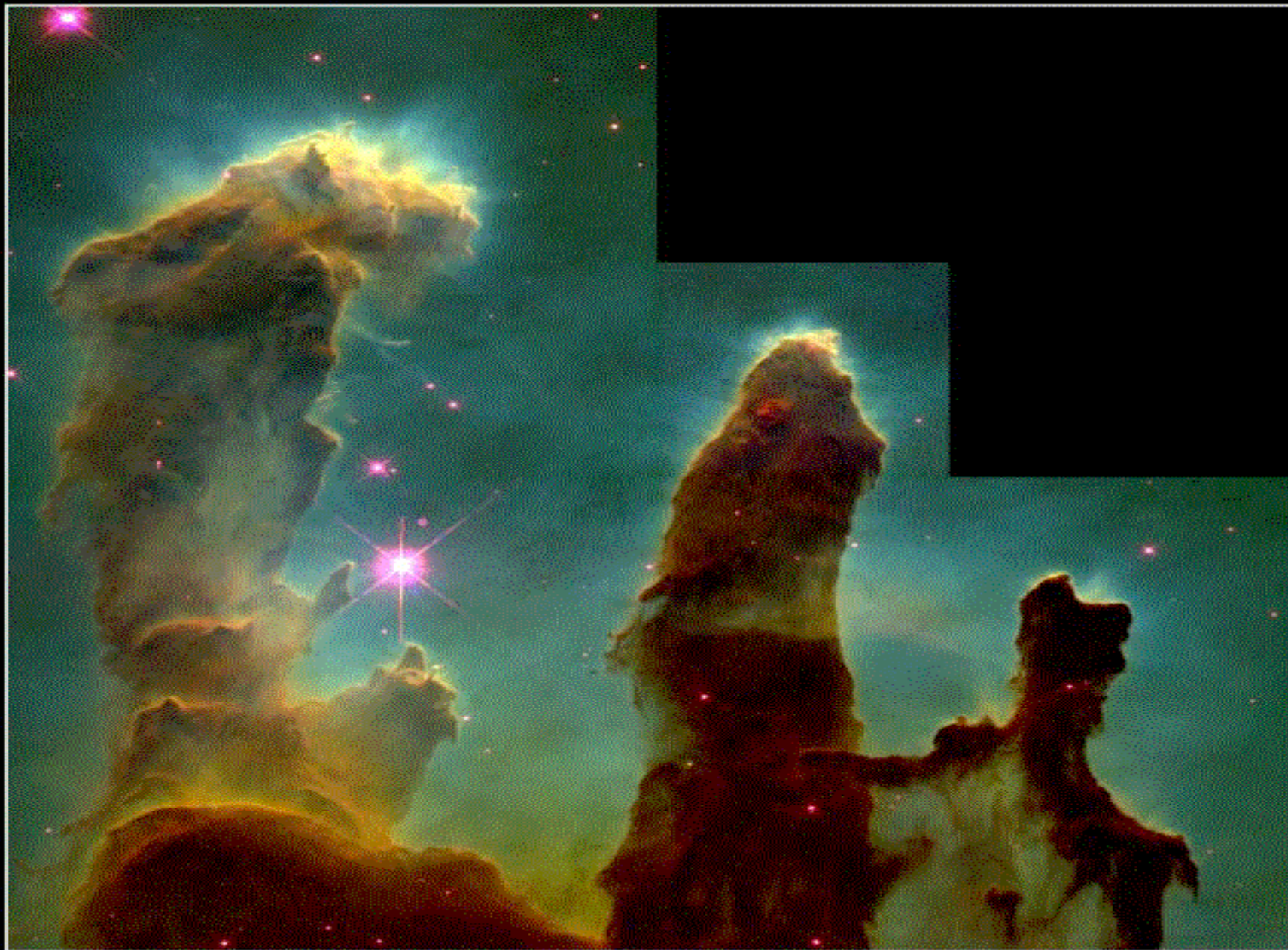
 James W. Head III
Brown University
 Stamatios M. Krimigis
JHU Applied Physics Laboratory



Description



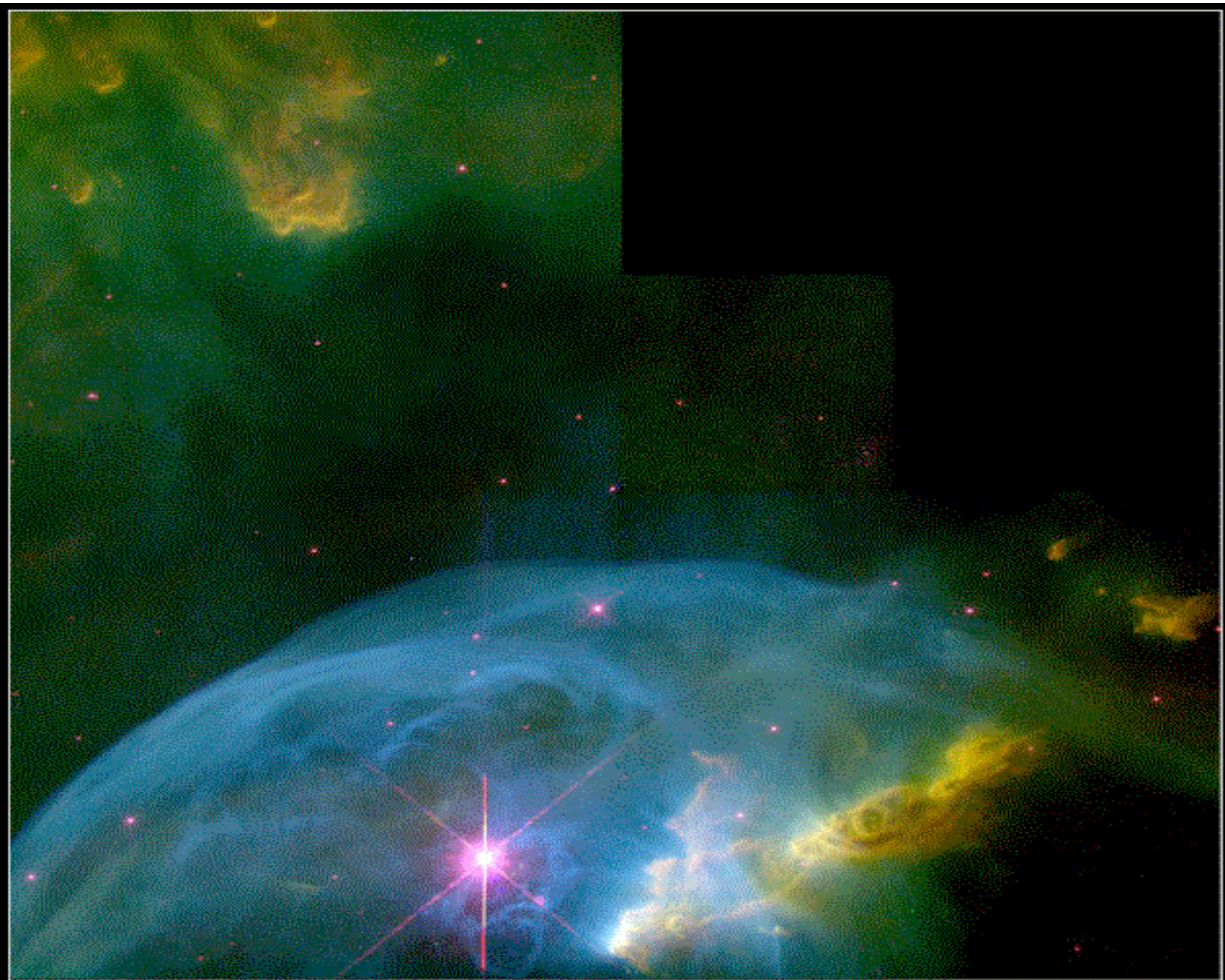
The Hubble Space Telescope (HST) was the first and flagship mission of NASA's Great Observatories program. Designed to complement the wavelength capabilities of the other spacecraft in the program (CGRO, AXAF, and SIRTf), HST was a 2.4 m, f/24 Ritchey-Chretien telescope capable of performing observations in the visible, near-ultraviolet, and near-infrared (1150 Å to 1 mm).



Gaseous Pillars • M16

HST • WFPC2

PRC95-44a • ST ScI OPO • November 2, 1995
J. Hester and P. Scowen (AZ State Univ.), NASA



Bubble Nebula • NGC 7635

HST • WFPC2

NASA, D. Walter (South Carolina State University)
and P. Scowen (Arizona State University) • STScI-PRC00-04

Credits: NASA, **Donald Walter (South Carolina State University)**, Paul Scowen and Brian Moore (Arizona State University)

Research Team: Donald Walter (South Carolina State University), Paul Scowen, Jeff Hester, Brian Moore (Arizona State University), Reggie Dufour, Patrick Hartigan and Brent Buckalew (Rice University).

Funding: Space Telescope Science Institute, **NASA MUSPIN** and NASA URC.

7.2 Proposal Preparation Checklist

Table 7.1: Proposal Preparation Checklist

| Step | Procedure |
|---|--|
| 1) Obtain Template | Send an e-mail message to <code>newprop@stsci.edu</code> containing the words 'request templates' in the subject line. |
| 2) Receive Template | <p>You will receive via return e-mail:</p> <ul style="list-style-type: none">- the Phase I Observing (GO/SNAP) Proposal Template file <code>obstemplate.tex</code> and the Archival Research (AR) Proposal Template file <code>artemplate.tex</code> ;- the style file <code>phase1.sty</code> which includes the <code>supertabular</code> files;- an example of a completed observing template file in <code>obsexample.tex</code> . |
| 3) Fill out the Template | Fill out the appropriate Proposal Template file using your favorite text editor. Detailed Instructions can be found in Section 8.1 . Summary instructions can be found in the templates themselves. |
| 4) Prepare a Postscript or PDF version of your proposal. | <p>For most proposers, the easiest way to produce a Postscript or PDF version of the proposal is to use the LaTeX software on the completed proposal template. If you are not familiar with LaTeX, please check with your system manager for how to run it on your system, and how to use PostScript encapsulation for any figures. The STScI Help Desk (see Section 1.5)</p> |
| 5) Send the completed proposal template to STScI: "LaTex Submission" | <p>To complete the first part of your submission, send the completed Phase I proposal LaTeX template file to STScI by e-mail to <code>newprop@stsci.edu</code> . Set the <code>formattedsubmission</code> keyword in the LaTeX template to either 'EMAIL' or 'FTP' (see Section 8.1.5), depending on how you plan to perform your formatted submission (see step 6).</p> |



What is the Earth Science Enterprise?

We understand some facets of our environment fairly well: short-term weather forecasts, basic hurricane tracking, and detecting changes on the Earth's surface. However, much critical information is missing: we cannot predict how the climate will shift a year from now, and what the effects will be on people whose livelihoods depend on that climate, from farmers to urban planners.

NASA's Earth Science Enterprise captures our spirit of exploration and focuses it on the Earth. NASA and its inter-agency and international partners are striving to discover patterns in climate which will allow us to predict and respond to environmental events - such as floods and severe winters - well in advance of their occurrence. Nations, regions, and individuals can then use this knowledge to prepare for these events, likely saving countless lives and resources.



Key Understanding

NASA uses the unique vantage point of space to provide the scientific basis for informed policymaking, and the research to support the operational missions of other US Governmental organizations. Results of ESE science research and applications provide an objective starting point for the development of sound global environmental policy.



Earth Science Missions

Earth Observing System (EOS) @GSFC (Atmospheric
Physics and Land Surface)

Commercial Remote Sensing

Earth Observing System (EOS) @JPL (Oceanography)

EO-1/EO-2 New Millennium Missions

Earth Observing System (EOS) @LaRC (Atmospheric
Chemistry)

New Millennium Program (NMP)

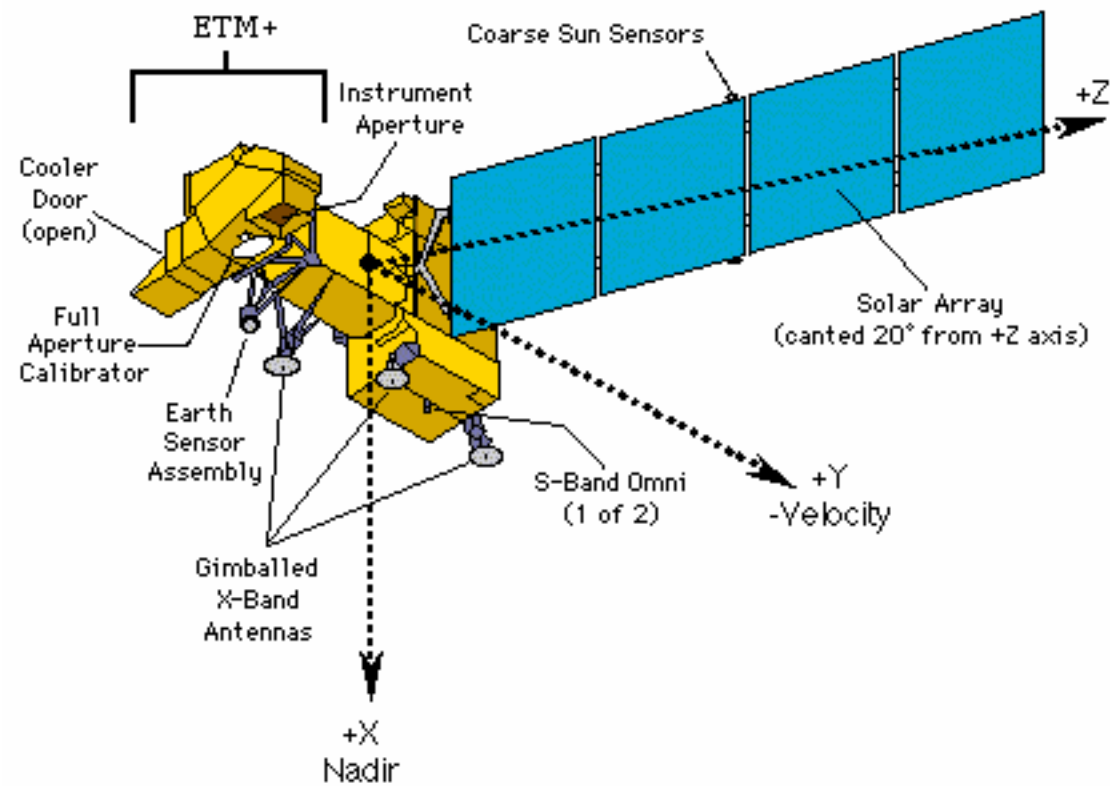
Earth Probes @JPL

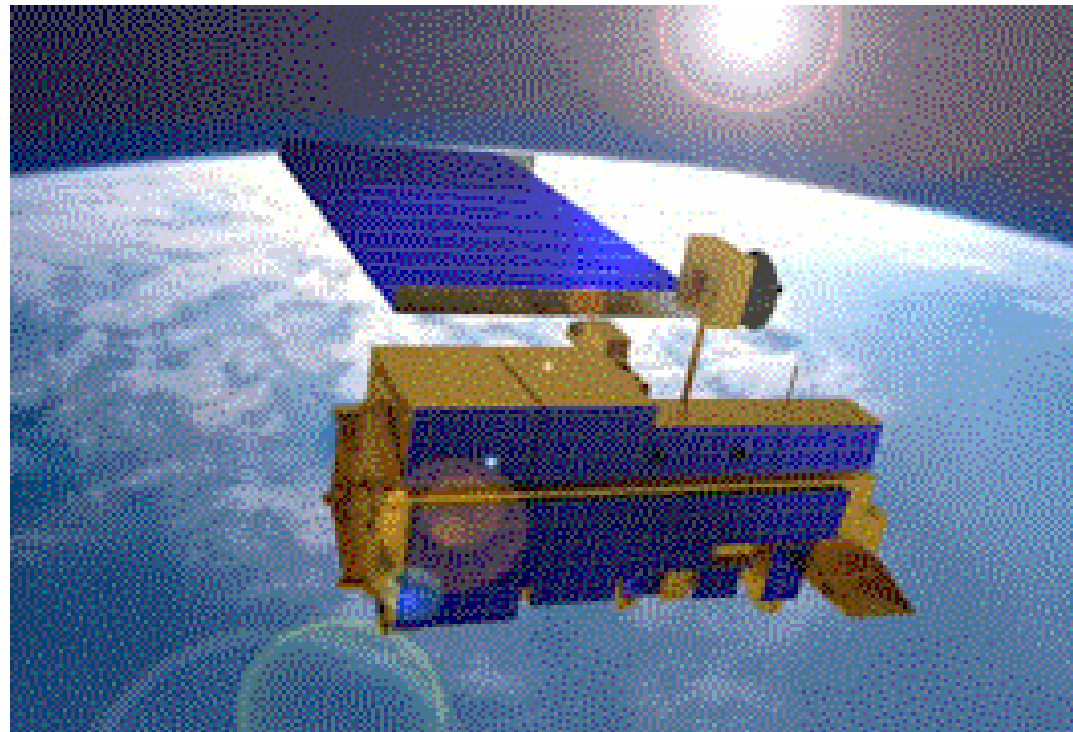
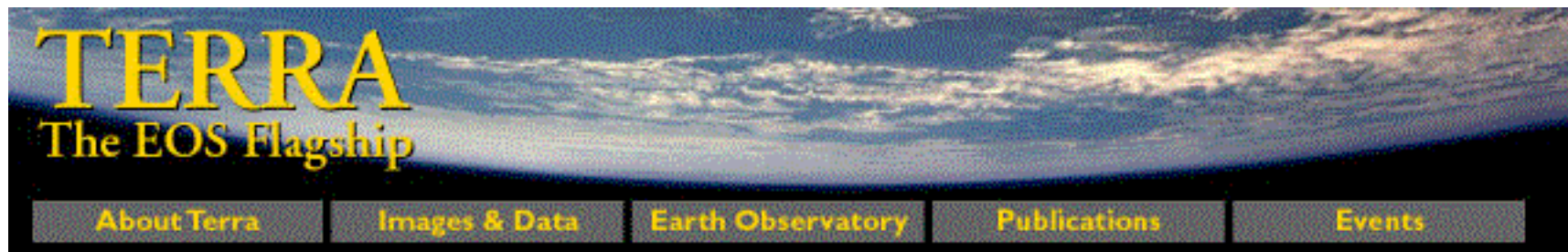
Polar Operational Environmental Satellites (POES)

Earth Probes @GSFC

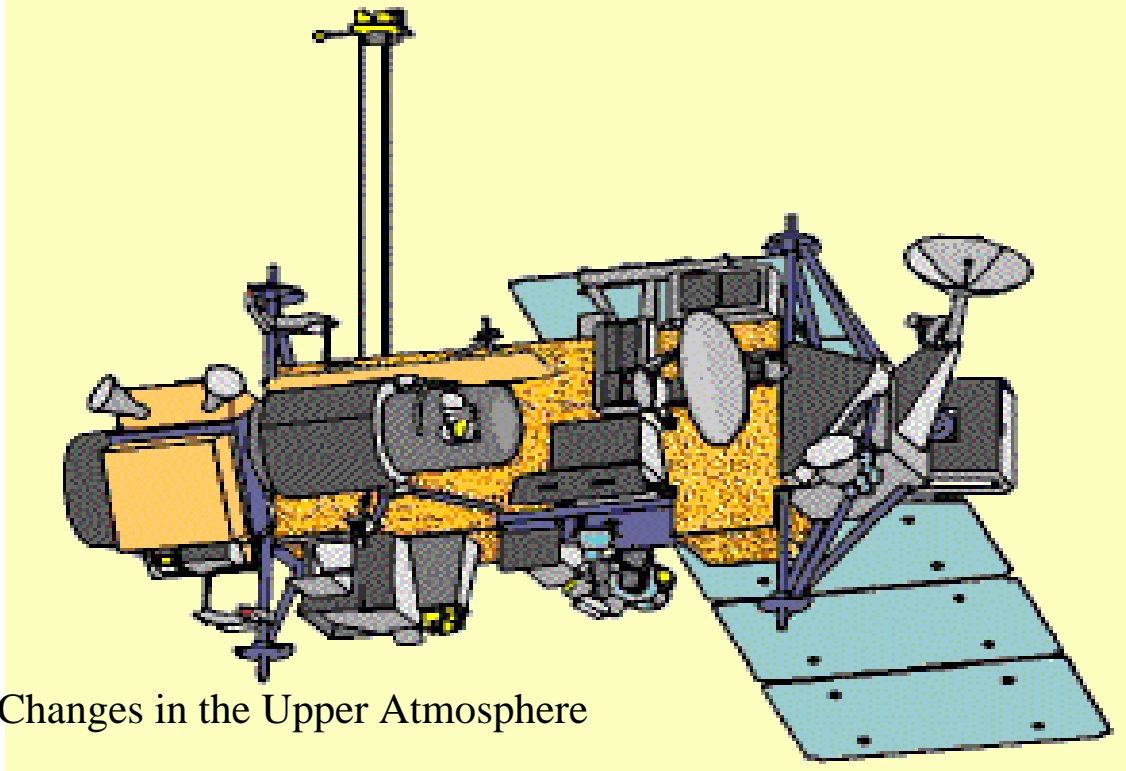
Earth Science Technology Program (ESTP)

Geostationary Operational Environmental Satellites
(GOES)





The UARS Flight Observatory



The Problem: Changes in the Upper Atmosphere

For several decades, scientists have sought to understand the complex interplay between chemistry, physical dynamics, and radiative processes that govern the structure of Earth's atmosphere. Much attention has now been focused on the upper atmosphere, with particular concern about two areas:

- the possible effect of natural and man-made influences, and
- the potential effects of changes in the upper atmosphere on such areas as climate, weather, and protection provided by the ozone layer.

NASA Earth Science Enterprise Research Strategy for 2000-2010

1. Introduction

The mission of NASA's Earth Science Enterprise (ESE) is to develop a **scientific understanding** of the **Earth system and its response to natural or human-induced changes** and **improve prediction capabilities for climate, weather, global air quality and natural hazards**. The Earth science research program aims to acquire a deeper understanding of the components of the Earth system and their interactions. These **interactions occur on a continuum of spatial and temporal scales** ranging from **short-term weather to long-term climate scales**, and from **local and regional to global scales**. The Enterprise also seeks to provide accurate assessments of changes in the composition of the atmosphere, the extent and health of the world's forest, grassland, and agricultural resources, and geologic phenomena that lead to natural hazards.

The strategic objective of the Enterprise is to provide scientific answers to the overarching question:

How is the Earth changing and what are the consequences for life on Earth?

NASA Earth Science Enterprise Research Strategy for 2000-2010

2. Earth System Science Issues

The key research topics studied by NASA's Earth Science Enterprise fall largely into three categories: **forcings, responses, and the processes that link the two** and provide feedback mechanisms.

How is the global Earth system changing?

What are the primary forcings of the Earth system?

How does the Earth system respond to natural and human-induced changes?

What are the consequences of change in the Earth system for human civilization?

How well can we predict the changes to the Earth system that will take place in the future?



NASA Earth Science Enterprise Research Strategy for 2000-2010

Basic Research and Data Analysis

The **intellectual capital** for both the **planning and exploitation** of Earth **system observations** is vested in an **robust research and analysis program**. Research and analysis is the conceptual source of Earth system science questions, and strategies to address them. The research program is at the **origin of new scientific ideas** and **emerging research approaches.....**

Institute on Climate and Planets (ICP)

CCNY Metropolitan Weather Network

A collaboration of universities, K-12 and NASA

In recent times, however, the most significant **anthropogenic forcing** of the planetary environment has been the modification of the **composition of the atmosphere**, leading to **rising** concentrations of a number of **reactive and radiation absorbing gases** that contribute to **depleting the stratospheric ozone layer** and to **increasing the atmospheric greenhouse effect**. The buildup of atmospheric CO₂, driven by the **combustion of fossil fuels along with deforestation and other changes in land use**, is the largest contributor to the global increase in the greenhouse effect. Quantifying the fraction of CO₂ from anthropogenic sources that accumulates and remains in the atmosphere (about half of total emission) is, in itself, a very complex problem, considering that CO₂ fluxes from the combustion of fossil fuels and changes in land use are but a small fraction of the large natural fluxes between atmospheric, terrestrial ecosystem, and oceanic reservoirs



University Earth System Science (UnESS)

Project Announcement of Opportunity

This Announcement of Opportunity (AO) is intended to **foster** the development of the **next generation of Earth system scientists, engineers, managers, educators**, and entrepreneurs through significant and meaningful **hands-on student involvement** in Earth observation space missions at the **university level**. The **hands-on student involvement** should include **helping prepare the proposal through analysis and distribution of the data** to the scientific community.

David E. Steitz
Headquarters, Washington, DC
(Phone: 202/358-1730)

March 31, 2000

RELEASE: 00-51

NASA AWARDS UNIVERSITY CONCEPT STUDIES FOR EARTH SCIENCE PROJECTS

The four concepts chosen for further development are:

*** The "SPACE" mission, proposed by Columbia University, New York, NY, would examine, from aboard the International Space Station, the scattering properties of clouds and aerosols over a two-year period.**

* The THOR mission, proposed by the University of Alabama in Huntsville, hopes to examine in unprecedented detail the growth and decay of thunderstorms through continuous observations of lightning over the Americas and adjacent oceans. By placing a lightning-monitoring sensor on a weather satellite, the THOR team hopes to gain radical new insight into the formation and evolution of thunderstorms.

* The Coral Reef Ecosystem Spectro-Photometric Observatory, proposed by the University of Hawaii, Kaneohe, would look at the health of coral reefs around the world. By using spaceborne spectral observations of the reefs, scientists hope to determine how climate change may be affecting these vital contributors to Earth's health.

* CIRRUS, proposed by the University of Wisconsin, Madison, would be an instrument flying aboard the International Space Station to look at clouds and, in particular, cloud ice. Understanding cloud ice will greatly enhance our understanding of clouds and their role in the global climate system.



National Aeronautics and
Space Administration

June 29, 1999

NRA-99-OES-02

RESEARCH ANNOUNCEMENT

OPPORTUNITIES TO PARTICIPATE IN
THE EARTH SCIENCE ENTERPRISE (ESE) EDUCATION PROGRAM

SELECTION RESULTS
FOR
NRA-99-OES-02

Opportunities to Participate in the Earth Science Enterprise Education
Program

Teacher Enhancement

Aponte-Avellanet, Ibis L **University of Puerto Rico****

Interactions and Diversity: Earth System Science and Beyond

Benson, Bernard W University of Tennessee Chattanooga

Pre-Service Teacher Enhancement Program

Hayden, Linda B Elizabeth City State University*

Mathematics of the Great Dismal Swamp

Kuglin, John R University of Montana

Earth Science Enterprise Research Program

Limaye, Sanjay S University of Wisconsin Madison

Earth Science Component for Academic Professional Enhancement (ESCAPE)

Locke, Sharon M University of Southern Maine

ACCESS Earth: Promoting Accessibility to the Earth System Sciences for Persons with Disabilities

Odell, Michael R L University of Idaho

NOVA Online ESS

Panah, Assad I University of Pittsburgh

An Interdisciplinary Teacher Training Program on Earth System Science Using Information Technology, 2000-2002

Strong, William R University of North Alabama

Earth System Science On-Line Course: On Opportunity in Geography Education

Student Enrichment

Chambers, Lin H Langley Research Center

Students' Cloud Observations On-Line (S'COOL): A Unique Project with Emphasis on Grades 4 and Under

Hayden, Linda B Elizabeth City State University*

You BE the Scientist with Satellite Imagery in EZ/EC Communities

Moon, Thomas Montana Technical University

STEP Careers in Research Exploration Program

Morris, Vernon R Howard University

Celebrating 20th Century Pioneers in Atmospheric Sciences

Olson, Tim Salish Kootenai College

Remote Sensing of Tribal Lands: Earth System Science Student Research Experiences at Salish Kootenai College

Yamaguchi, Janet Discovery Science Center

The Dynamic Earth

Curriculum Support

Blount, Grady Texas A&M University Corpus Christi
The Translingual Earth System Science Education Center

Butcher, Ginger Goddard Space Flight Center
The Pigeon Adventure: An Adventure through Remote Sensing History

Gobert, Judith M **Salish Kootenai College****
NASA Native Earth Systems Science Curriculum Project (NЕСP)

Kahn, Ralph A Jet Propulsion Laboratory
Practical Uses of Math And Science (PUMAS)

Pickle, John D AER, Inc.
Enhance of the Global Systems Science Student Guide Series for the Digital Earth Initiative

Vierling, Lee A South Dakota School of Mines & Technology
Earth Systems Connections: An Integrated K-4 Science, Mathematics, and Technology Curriculum

Digital Earth

Gordin, Douglas N Michigan State University

Pending Availability of Funds: (Transforming Learning and Traveling through the Digital Earth)

Rodriguez, Waldo J Norfolk State University*

Scenario Based Learning: Inquiry for a Digital Earth



Expected Outcomes

- MU-SPIN will increase the number of proposals MURED receives from traditionally underrepresented minority institutions.
- MU-SPIN will increase the number of minority institutions participating in and benefiting from NASA education programs.
- MU-SPIN will assist in identifying barriers for minority institutions to participate in NASA Enterprise programs.
- MU-SPIN will address and outreach technology issues for minority institutions to compete in the 21st century.
- MU-SPIN will improve the effectiveness of MURED's funded initiatives for education and research.
- MU-SPIN will assist in identifying qualified candidates from minority institutions to assist NASA with diversity goals for employment.